Impacts of the Strategic Networks and Initiatives Program (SNIP) as an Incentive for Engagement in Interdisciplinary Research

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Background to the SNIP Grants Program

Overview

Creating incentives for faculty to develop and grow research programs is an important role of the administration of the College of Agricultural Sciences (CAS) at Penn State. Grants, matching funding, new equipment, and allocation of space can motivate faculty to invest efforts in new projects of high institutional priority. The Strategic Networks and Initiatives Program (SNIP) was established in 2014 by the Associate Dean of the Office of Research and Graduate Education in the CAS as a new strategy to promote collaborative disciplinary and interdisciplinary culture in the college. The program was created to support the formation of interdisciplinary faculty teams and networks that will advance research in five strategic cross-cutting research thematic areas outlined in the CAS strategic plan. The SNIP program is designed to capitalize on the collective expertise within our college and promote faculty-driven initiatives that will strengthen existing programs and promote new interdisciplinary research programs as well to prepare the teams to respond to and take advantage of external grant opportunities.

The CAS interdisciplinary strategic cross-cutting areas include:
- **Advanced Agricultural and Food Systems**—transforming thinking and practice in agricultural and food systems through research focused on productivity, sustainability, and adaptability.
- **Biologically Based Materials and Products** - discovering novel approaches using genetic systems and biological materials to create value-added commercial and consumer products in a sustainable, profitable manner.
- **Environmental Resilience** - providing innovative research to enhance and protect managed and natural ecosystems, ecosystem services, and human well-being.
- **Global Engagement** - advancing global solutions to challenges in agriculture, health, and sustainability that impact the future of an interconnected world.
- **Integrated Health Solutions** - improving the health of humans, animals, and communities through research into preventive, corrective, diagnostic, and predictive solutions to the challenges presented by lifestyle, diseases, pests, and toxins.

This report includes an evaluation of the impacts of SNIP after three award cycles (2014, 2015, and 2016). The study aims to assess the extent to which the SNIP grants: (1) stimulated faculty interest in engagement with interdisciplinary research; (2) served as incentive for the development of new partnerships and programs; (3) created value for the individual faculty members and extended their networks; and (4) served as a platform to build larger externally funded programs.

SNIP Program Summary

During a 3-year period the program has awarded 19 individual proposals that have involved 83 faculty as principal investigators (PIs), co-PIs, or participants. Interdisciplinary faculty groups received grants ranging from $9,000 to $25,000. To be eligible for funding the PI had to be a CAS faculty member and the proposed activities had to include faculty from multiple CAS

departments as co-PIs or participants. Suggested collaborative activities described in the request for proposals included:
- Developing interdisciplinary research teams or networks
- Hosting workshops or conferences on an emerging interdisciplinary research area
- Supporting a high-level seminar series to promote networking that will lead to the formation of an innovative program
- Creating enabling technologies such as research collaboration websites or social networking tools to facilitate large-scale research programs

Additional information about the SNIP program can be found at the program's website: http://agsci.psu.edu/research/snip.

Total external funding reported by SNIP recipients by the summer of 2017 was $3.9 million dollars (with an additional $3 million pending), indicating that every dollar invested in SNIP returns on average more than $8 in additional research funding. SNIP has been successful in encouraging and fostering external funding among SNIP recipients.

Purpose and Structure of the Evaluation

At the conclusion of the first three years of the program, an online survey was conducted with recipients of SNIP grants. Respondents were asked to share their experiences with the SNIP program. The main goals of the survey were to identify areas of strengths and weaknesses of the program and solicit suggestions for future improvement. Additionally, the evaluation aimed to understand if and how the SNIP awards have contributed to the development of interdisciplinary networks and to securing external funding. The results of this evaluation will be used inform decisions regarding the future direction of the SNIP program.

The survey was designed to answer the following main questions:
- What are the demographics and the membership composition of the SNIP teams?
- What are main areas/activities of the SNIP projects?
  - Networking
  - Research activities
- Did the SNIP grants bring any value to the individual recipients?
- What are the SNIP recipients' self-reported experiences with the SNIP program?
- Did the SNIP grants support the development of new grant proposals? (New funding acquisition)

Methodology and Procedures

The survey was constructed in the online survey platform Survey Monkey and distributed after approval by the Penn State Institutional Review Board. The survey was sent to an email list of 83 faculty, including PIs, co-PIs, and participants listed on the SNIP grant applications for years 2014, 2015, and 2016. The survey was first sent on June 26, 2017, with reminders sent on July

21 and July 26. A total of 40 individuals responded to the survey, for a response rate of 48.2%. One respondent's answers were removed from the analysis after they reported that they had not actively participated in the SNIP program, bringing the final number of respondents to 39.

The survey results were analyzed with SPSS statistics. The survey included closed-ended and open-ended questions. Frequencies of responses for each question in the survey are reported for closed-ended questions. Results of open-ended questions were categorized and are reported descriptively throughout the report. This report describes the results of the survey and is organized in seven parts: 1) Respondents' Demographic Information; 2) SNIP Project Information; 3) Membership of SNIP Projects; 4) Networking as a Result of SNIP Funding; 5) External and Internal Funding Acquisition; 6) Research Activities Generated; and 7) Perceived Value of the SNIP Program.

Survey Evaluation Results

Respondents' Demographic Information

The survey asked respondents to indicate their current faculty title and their role in the project as principal investigator or co-investigator, and whether they are still involved in the SNIP project.

What is your current faculty title?
The majority of respondents (55%) were full professors. Eleven percent of respondents were assistant professors and 26% were associate professors. Only 8% of respondents were non-tenure track faculty members (Figure 1).

Figure 1: Current Faculty Title
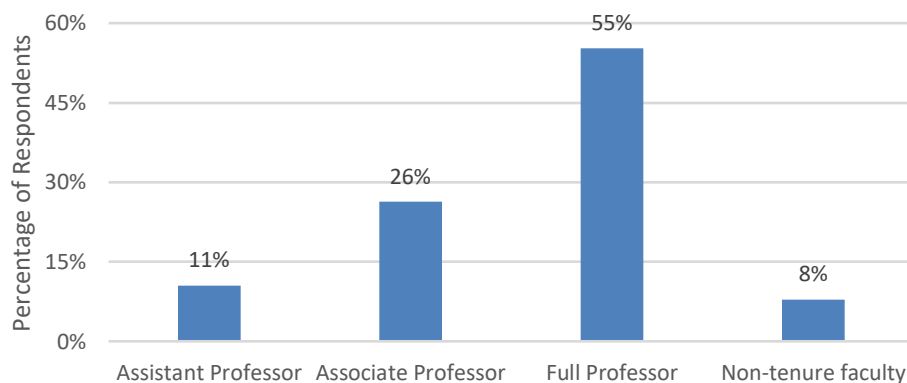
Are you a PI or co-PI on a SNIP grant?
Twenty-eight percent of respondents were PIs on a SNIP grant, while the other 72% were co-PIs (Figure 2).

Figure 2: PI Status on SNIP Grant
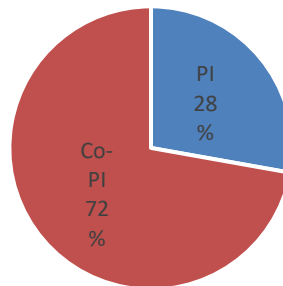
Are you still involved in the SNIP project you received funding for?
Most respondents (64%) indicated that they are still involved in the SNIP project they have received funding for. Thirty-six percent indicated they were no longer involved in their SNIP-funded project (Figure 3).

Figure 3: Current Involvement in SNIP Project
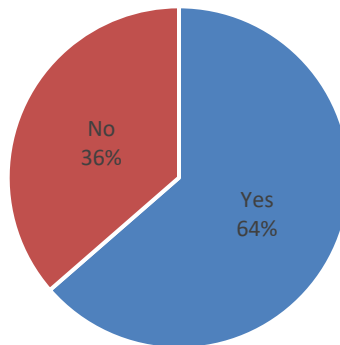
SNIP Project Information

Respondents were asked to provide information about which cross-cutting thematic area their SNIP work represented, the year they received funding, and activities they have engaged in related to the SNIP project.

Which cross-cutting thematic area does your SNIP-funded work represent?
The five cross-cutting areas designated by the CAS as target areas for SNIP funding were listed in the survey and respondents were asked to indicate which of the areas applied to their project. Respondents were asked to choose all areas applicable to their project. The most frequently cited cross-cutting area was "*Advanced agricultural and food systems,*" with 56% of all respondents indicating their project addressed this issue. Twenty-six percent indicated their project addressed issues of "*Environmental resilience*" and 15% addressed "*Integrated health solutions.*" The least common cross-cutting areas were "*Biologically based materials*" (10%) and "*Global engagement*" (10%; see Table 1).

Secondary data were used to compare these survey responses to the official submitted SNIP proposal of funded projects (Table 1). Each written proposal indicated which of these five areas was addressed in the project (they could choose more than one area). This comparison was made in order to understand whether the respondents' self-reported thematic areas (representing 41% of all SNIP participants) are representative of the areas listed in all funded SNIP projects. The results indicated that the *Advanced agricultural and food systems* thematic area was equally represented. However, all of the other thematic topics were underrepresented among survey responses.

Table 1: Cross-Cutting Priority Area of SNIP Projects

Thematic Area	Survey Respondents (%) ($n = 39$)	SNIP Projects (%) ($n = 20$)
Advanced Agricultural and Food Systems	56%	55%
Biologically Based Materials and Products	10%	25%
Environmental Resilience	26%	40%
Integrated Health Solutions	15%	45%
Global Engagement	10%	30%

In which academic year did you receive SNIP funding?
Forty-six percent of respondents to the survey received funding during the 2016–2017 academic year (Figure 4).

Figure 4: Year SNIP Funding Received
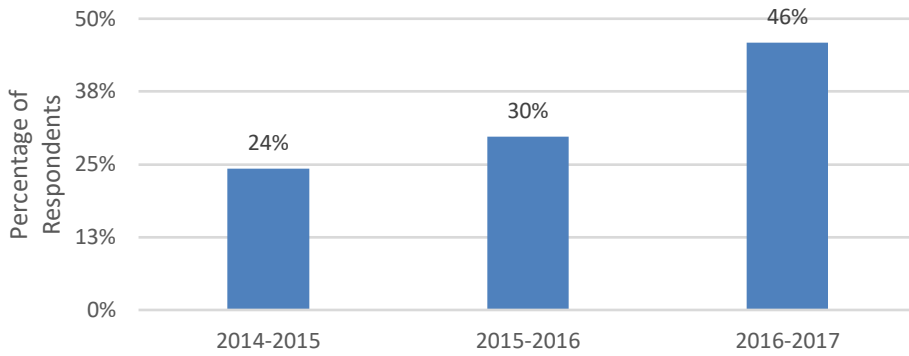
As a result of carrying out SNIP activities, did you or your team engage in any of the following activities?

Six choices were included for this question corresponding to activities described in the SNIP request for proposals. Possible answers included: had participated in the activities; not yet participated but planning to; or not planning to participate in the future (Figure 5). The majority of respondents reported that they had developed a new research project (58%). The next most common activity SNIP recipients engaged in was the organization of seminar series (57%). The activity with the highest frequency of those who had not yet participated but planned to in the future was the development of a new research project (26%). The most common activities participants had not engaged in and had no plans to in the future were creating new tools to foster communication within their SNIP group (64%) and using social networking tools to facilitate communication with the public (63%).

Figure 5: SNIP Activities

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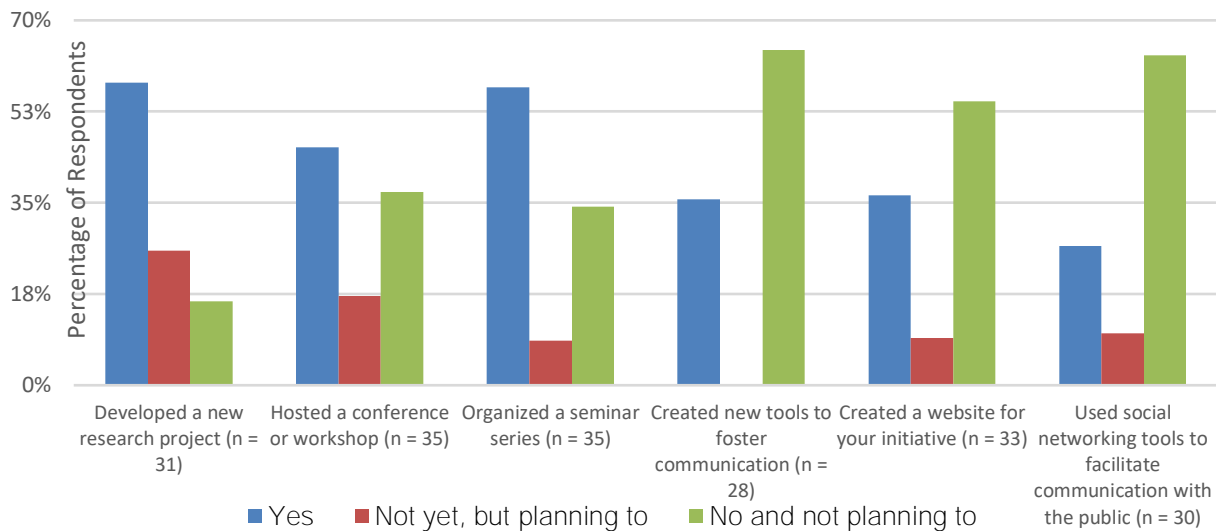
Membership of SNIP Projects

Respondents were then asked questions about the composition of their SNIP team upon project initiation and if any additional team members had joined after the project began.

Think about the original members of your SNIP team. Which departments in the College of Agricultural Sciences do they represent?

Respondents were asked to select all departments within the CAS that their SNIP team members represented. The most common department indicated by the survey participants was Plant Pathology and Environmental Microbiology (79%), followed by Plant Science (56%) (see Figure 6 for a full list of all departments included in SNIP funding as reported by respondents). In order to compare the representation of the departments in the survey versus departments represented in the original proposals, secondary data were extracted from all funded SNIP proposals. The analysis demonstrated that the Department of Plant Science had the highest representation in the original proposals (19), followed by similar representation of Plant Pathology and Environmental Microbiology (11), Entomology (11), and Veterinary and Biomedical Sciences (10) (see Figure 6 and Table 2). All other departments—Ecosystem Science and Management; Agricultural Economics, Sociology, and Education; Agricultural and Biological Engineering; Animal Science; and Food Science—were represented by 5–8 faculty each for the 3-year period. PPEM faculty were overrepresented in the survey.

Figure 6: Departments Represented in SNIP Projects (survey results)

Percentage of Respondents

Department	Percentage
Plant Pathology and Environmental Microbiology	79%
Plant Science	56%
Ecosystem Science and Management	49%
Entomology	39%
Food Science	28%
Agricultural and Biological Engineering	28%
Agricultural Economics, Sociology, and Education	26%
Animal Science	26%
Veterinary and Biomedical Sciences	23%
Other	13%
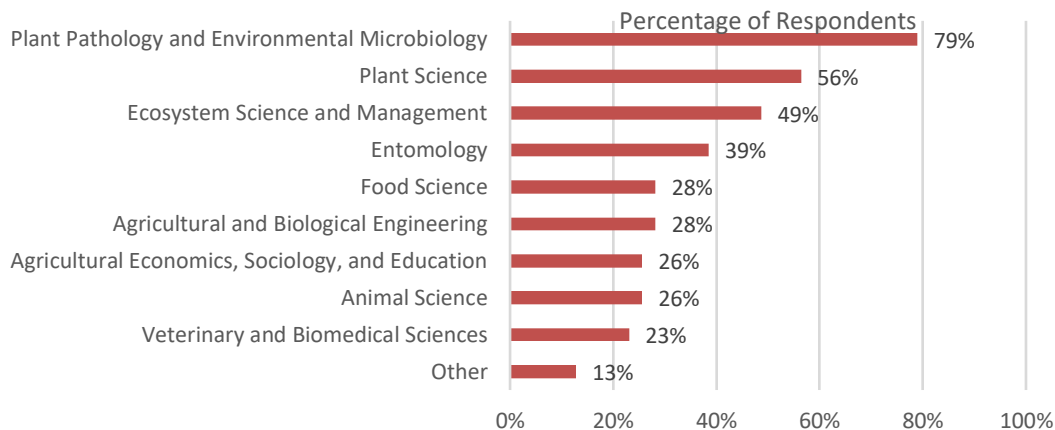
Table 2: Departmental Representation of SNIP Funding

Department	Individual Faculty Who Received SNIP Funding (n = 83) (%)	Individual Faculty Who Received SNIP Funding (n = 83) (#)
Agricultural Economics, Sociology, and Education	8.4%	7
Agricultural and Biological Engineering	6.0%	5
Animal Science	6.0%	5
Ecosystem Science and Management	8.4%	7
Entomology	13.3%	11
Food Science	9.6%	8
Plant Pathology and Environmental Microbiology	13.3%	11
Plant Science	22.9%	19
Veterinary and Biomedical Sciences	12.0%	10

Respondents were given the option to also include faculty involved in the SNIP project who did not affiliate with the major CAS departments by selecting "Other" and indicating the affiliations of these individuals. These affiliations included:
- Agricultural Analytical Services Lab, Penn State
- Department of Biology (College of Science, Penn State)
- Penn State Extension
- Personnel from CAS International Programs

There were also SNIP members with affiliations through the government:
- Pennsylvania Department of Health
- USDA Agricultural Research Service

Have any other faculty joined your SNIP group who were not listed on the original proposal?
Thirty-nine percent of respondents were not sure, 33% reported yes, and 28% reported no (Figure 7).

Figure 7: Addition of New Faculty Members to SNIP Project
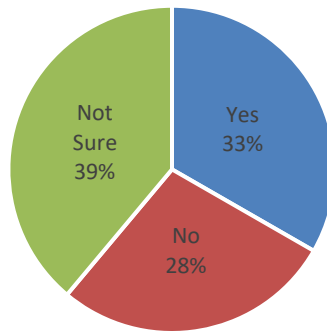
How many new members were added to your SNIP group who were not on the original proposal?

Seventeen respondents indicated that they had added new faculty members to their SNIP project. Most respondents indicated that they have added 2-4 members ($n = 7$). Five respondents reported their group added five or more new SNIP members. Another five respondents were not sure how many SNIP members were added (Figure 8).

Figure 8: Number of New Faculty Added to SNIP Project
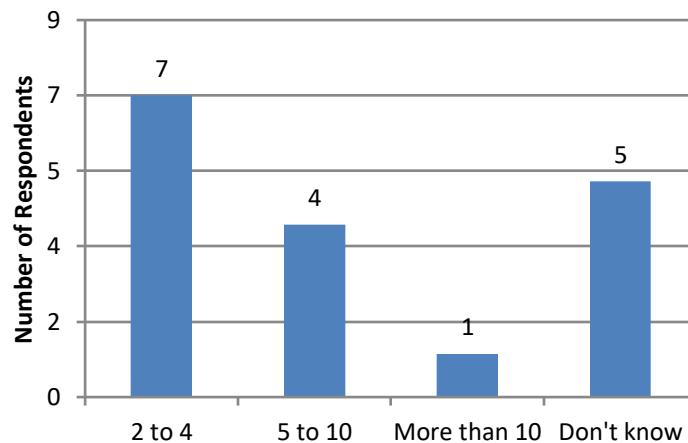
Networking as a Result of SNIP Funding

The next set of questions asked respondents to indicate the networking activities and teams they have created as a result of their SNIP funding, their perceptions of the success of their networking, and whether they felt the SNIP funding helped them establish partnerships within and outside the CAS at Penn State.

As a result of your SNIP funding, did your group establish interdisciplinary teams or networks?
The majority of respondents indicated they had established interdisciplinary teams or networks as a result of SNIP funding (74%). Nine percent did not establish new teams or networks, and 17% indicated they were unsure (Figure 9).

Figure 9: Establishment of Interdisciplinary Teams and Networks
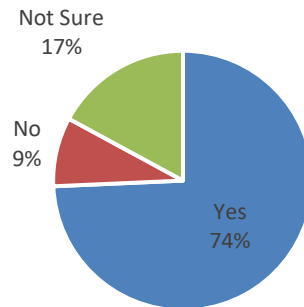
If yes, how successful do you think your group was in establishing teams or networks?
Those who reported that they had established interdisciplinary teams and networks (*n* = 31) were then asked to indicate the level of success they felt their group had in establishing these team networks. The available choices were: *Not at all Successful, Unsuccessful, Neither Successful nor Unsuccessful, Successful,* or *Very Successful*. Fifty-five percent of respondents to this question considered their group to have been "successful" and 16% considered that they were "very successful" (Figure 10).

Figure 10: Level of Success in Establishing Interdisciplinary Teams and Networks
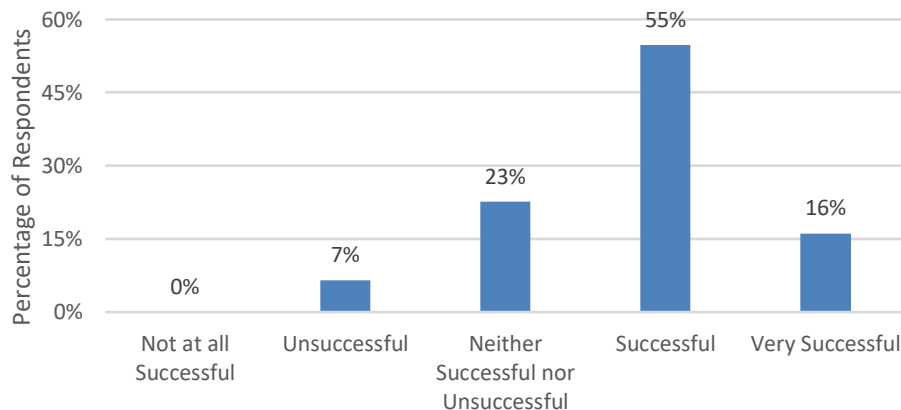
Did the SNIP initiative serve as a platform to build partnerships with other researchers in the College of Agricultural Sciences or across the university?
Respondents were asked to indicate whether they considered that their SNIP initiative has served as a platform to build partnerships with other researchers in the CAS or across Penn State. The

majority of respondents (43%) felt the SNIP project helped provide a platform to build these partnerships in both the college and the university (Figure 11). Twenty-nine percent felt the SNIP project helped provide a platform to build these partnerships only within the CAS. Twenty percent felt the SNIP project did not serve as a platform to build these partnerships.

Figure 11: SNIP Project as Platform for Partnerships
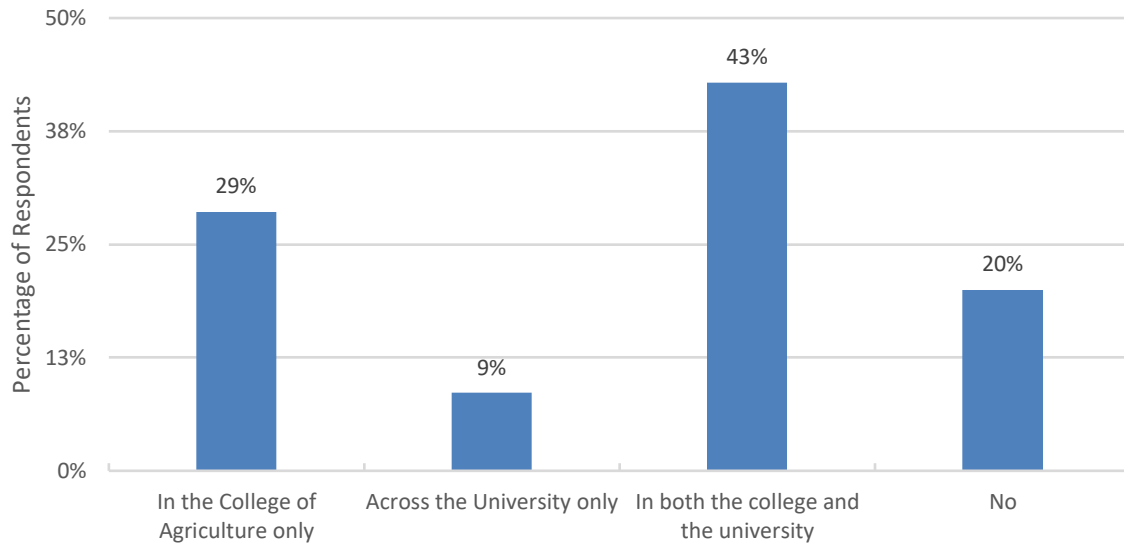
If yes, please describe the partnerships.
Those who indicated that the SNIP project helped foster partnerships either at a college or a college and university level were asked to describe the partnerships they formed. Four key themes or categories were created from the open-ended responses. Many respondents specifically mentioned the *affiliation of their partnerships*. Respondents also described the *nature of the relationship*, the *research activities* engaged in, and the *intellectual nature of problem solving* with others.

Affiliation of partnerships
Colleges within Penn State
- College of Engineering (6)
  - Within the College of Engineering, both mechanical (2) and chemical (1) engineering
- College of Communications (3)
- Eberly College of Science (2)
- Biochemistry and Molecular Biology (1)
- College of Earth and Mineral Sciences (1)
- College of Medicine (1)
- College of Liberal Arts (1)

Departments within the College of Agricultural Sciences
- Agricultural and Biological Engineering (1)

- Plant Science (1)
- Entomology (1)
- Animal Science (1)

Other partnerships mentioned
- FDA
- Merck Institute of Life Sciences

Nature of relationship
- Creation of interdisciplinary teams (3)
- Stronger relationships, communication, and collaboration (2)

Research activities
- Grant and proposal development (6)
- Training, seminars, outreach, and research activities (5)

Intellectual nature of problem solving
- Solving problems in new ways (2)

External and Internal Funding Acquisition

The next section of the survey asked respondents to describe their experiences related to obtaining additional external and internal funding as a result of their SNIP collaborations.

In your experience, would you say that the SNIP program helped foster collaboration for external funding?
Fifty percent of respondents indicated "Yes," while 21% of respondents indicated "No" (Figure 12). Twenty-nine percent of respondents were not sure.

Figure 12: SNIP Program Helped Foster External Funding Collaboration
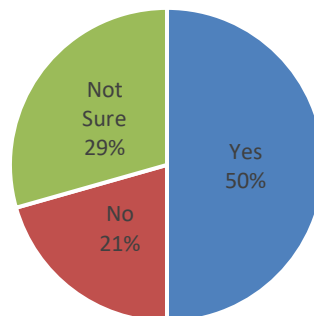
Please explain your answer above.

All respondents were asked to elaborate on their answer to the previous question. The responses were categorized into the following general categories: descriptions of funding applied for or received, creation of partnerships for future funding, future plans to submit, challenges/critiques, helped create preliminary data for grant seeking, and reaffirmed interdisciplinary importance.

- ***Description of funding applied for or received*** (12)
- ***Creation of partnerships for future funding*** (5)
- ***Future plans to submit*** (5)
- ***Challenges/critiques*** (5)
  - ○ *Faculty turnover or mismanagement* (3)

    "I question the rationale for this program. As first advertised, the call indicated (and this survey does as well) that funds could be used to advance research, however after applying we found out it was intended to "get people talking." Of the SNIP groups I know of, they consist of groups that were already talking to each other, so it is unclear what the funding was used for. Of similar programs I know of at different universities, the approach is to fund high-risk, short-term research projects that if successful, will bring together groups of researchers to expand it. I think this is a more effective approach than paying to have people talk. Successful researchers at PSU are either already talking to one another, or are motivated to find one another. Money would be better spent if these individuals could get seed money to try out their ideas."

- ***Helped create preliminary data for grant seeking*** (2)
- ***Reaffirmed interdisciplinary importance*** (1)

    "SNIP program definitely motivated me to participate in the INFEWS [Innovations at the Nexus of Food Energy and Water] proposal development, when I would not have otherwise. Because SNIP signaled that the college supports interdisciplinary interactions, my natural inclinations to be interdisciplinary were affirmed, which motivated me even more to work with other colleagues."

Has your SNIP research group applied for external funding?

Next, the respondents were asked whether their SNIP research group applied for any external funding. Fifty-three percent indicated they had, 31% are planning to but have not yet applied, and 16% have not applied for external funding and are not planning to apply (Figure 13).

Figure 13: Application to External Funding
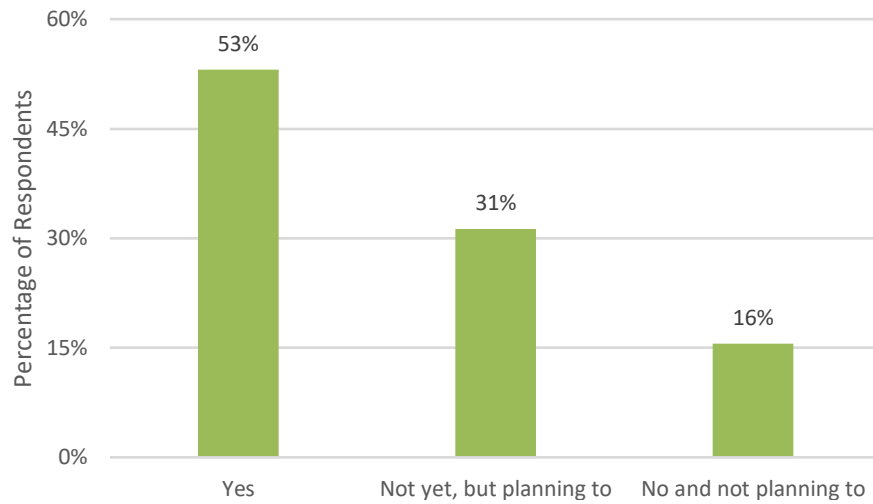
If yes, was the proposal funded?

Those who indicated they had applied for external funding ($n = 18$) were asked whether the proposal was funded. Thirty-nine percent of respondents who had applied to external funding received funding while 22% indicated that their proposals were still under review (Figure 14). Thirty-nine percent did not receive funding.

Figure 14: Funding Status of External Proposals
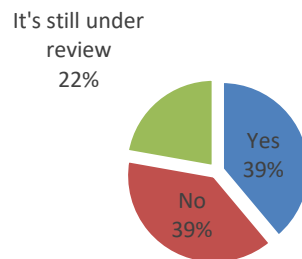
If yes, please provide details about your funded project.

Those who indicated their external funding proposals had received funding were asked to provide details about their funded project. They were asked to indicate the source of funding, the dollar amount received, the length of the funded project, the cross-cutting issue the project addresses, and the individuals involved in the project. The responses to these questions can be seen below and in Figures 15–17.

The funding source or agencies included:

- USDA (6)
- USDA-AFRI (3)
- USDA-NIFA (2)
- Consultative Group on International Agricultural Research (CGIAR) (2)
- FDA (1)
- USAID (1)
- PA Specialty Crop Program (1)
- Northeastern IPM Center (1)
- PA Sea Grant (1)
- USDA-NRCS (1)
- USDA-Regional Conservation Partnership Program (1)
- PD (1)
- STEP (1)
- National Needs Graduate and Postgraduate Fellowship (NNF) (1)
- North American Pollinator Protection Campaign (NAPPC) (1)

Figure 15: Amount of External Funding Received
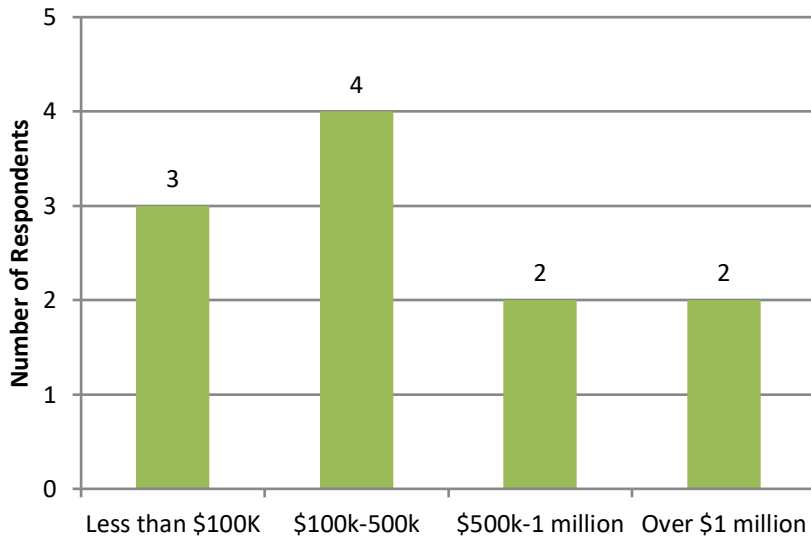
Figure 16: Externally Funded Project Duration
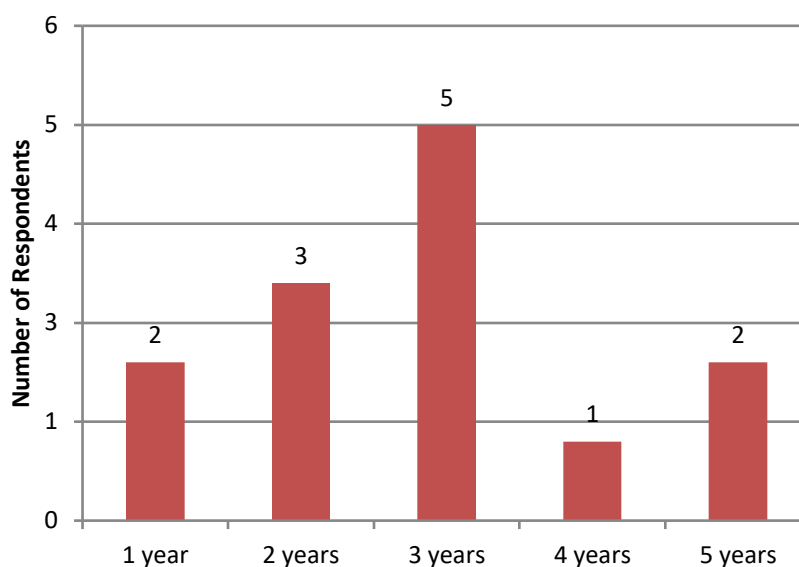
Figure 17: Cross-Cutting Priority Area of Externally Funded Project
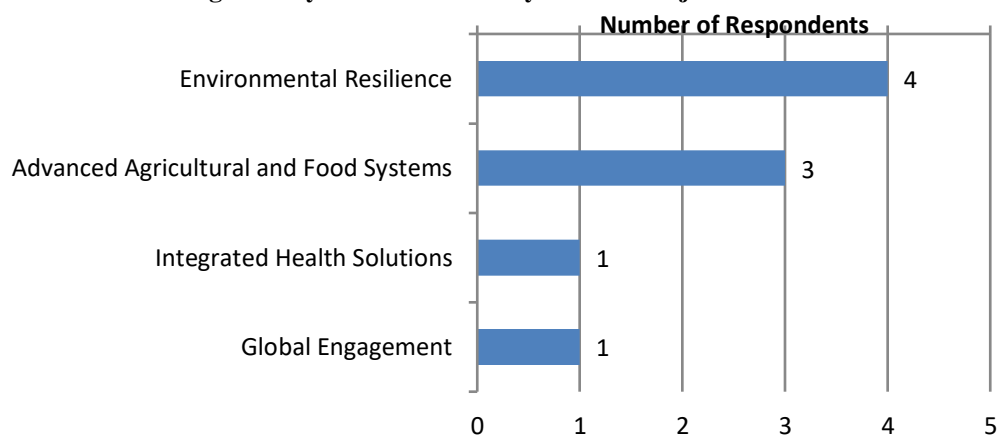
Four respondents did not indicate an existing area of cross-cutting priority from the CAS. These four unique responses included:
- Advanced training for gender postdocs in the CGIAR system
- Soil organisms for climate change and nutrient cycling
- Water quality
- Pharmaceuticals and personal care products (PPCPs)

Table 3: Names of Faculty on Externally Funded Grants

Alphabetized list of last names of faculty on externally funded grants						
Ahmad	Braiser	Fleischer	Hill	Lopez-Uribe	Rajotte	Ward
Barbercheck	Bruns	Gall	Hines	Luthe	Sachs	Watson
Behring	Campbell	Gasco	Jensen	Mendum	Swistock	Zimmerman
Biddinger	Dell	Glenna	Karsten	Miller	Tickamyer	
Borrelli	Elliott	Grozinger	Kovac	Patch	Tooker	

The last names of graduate students funded on these external grants included:
- Ball
- Coultier
- Kibuye
- Randhawa
- Flonc
- Bernardini
- Field

In your experience, would you say that the SNIP program helped foster collaboration for internal funding?

Next, respondents were asked about internal funding activities. Fifty percent of respondents indicated that the SNIP program had helped foster collaboration for internal funding and 15% indicated that it was not helpful (Figure 18). Thirty-five percent of respondents were not sure.

Figure 18: Helpfulness of SNIP Program in Establishing Collaboration for Internal Funding
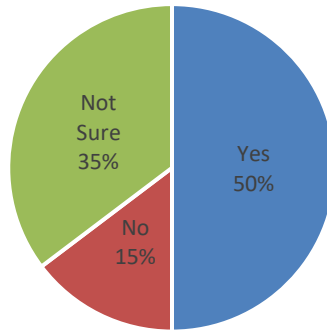
Please explain your answer above.
All respondents were asked to explain their answer to the question above in an open-ended question format.

- Brought people together (5)
- Have not sought internal funding (3)
- Applied and did not receive internal funding (2)
- SNIP not key reason proposal was submitted or not (2)
- Fostered activities which strengthened partnerships and funding (2)
  - Helped fund preliminary data used in proposals
  - Symposium and stakeholder advisory board was created to advise on funding

Has your SNIP research group received any internal funding?
Respondents were asked whether their SNIP group has received any internal funding from Penn State. Sixty-seven percent have not received any internal funding and 33% have received internal funding (Figure 19).

Figure 19: Received Internal Funding
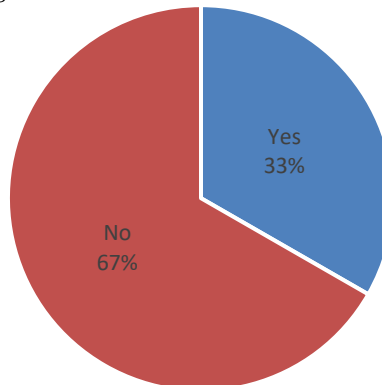
If yes, what was the source of the internal funding?
Those who had received internal funding were asked to indicate the source of the internal funding. The sources of internal funding are listed below:

- CAS seed grant (3)
- Penn State Institutes of Energy and the Environment (PSIEE) (4)
- Social Science Research Institute (SSRI) (2)
- SNIP graduate training grant (1)
- Office of Physical Plant (1)

Research Activities Generated

The next set of questions in the survey asked respondents to indicate the types of research activities generated as a result of their SNIP activities. Respondents were asked whether the SNIP activities stimulated faculty participation in interdisciplinary research, generated new research activities and programs, and resulted in new graduate student projects.

In your opinion did the SNIP activities stimulate faculty participation in interdisciplinary research?
Eighty-three percent of respondents indicated "yes" that the SNIP activities stimulated faculty participation in interdisciplinary research (Figure 20).

Figure 20: SNIP Stimulated Faculty Participation in Interdisciplinary Research
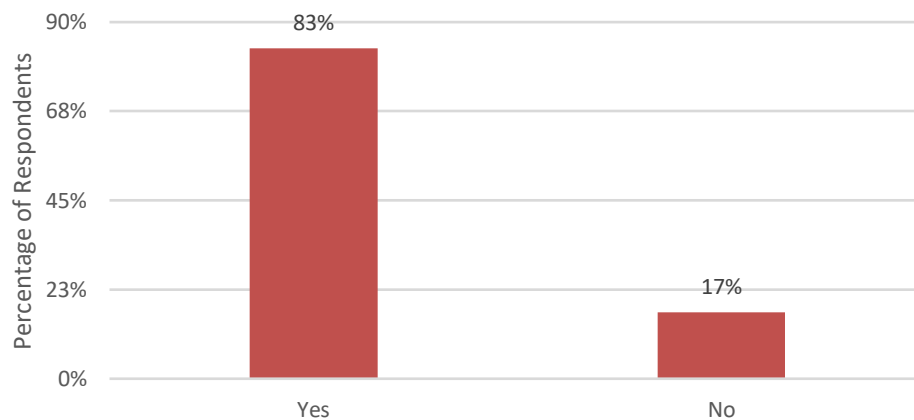
Did your team efforts generate new interdisciplinary research activities and programs?
Respondents were asked to indicate whether their team efforts generated new interdisciplinary research activities and programs. Respondents could reply "yes," "not yet, but planning to," or "not yet and not planning to." Fifty-six percent of respondents reported yes, their team efforts generated new interdisciplinary research activities and programs (Figure 21). Thirty-nine percent reported they had not yet done so but are planning to in the future.

Figure 21: Engagement in Interdisciplinary Research Activities and Programs
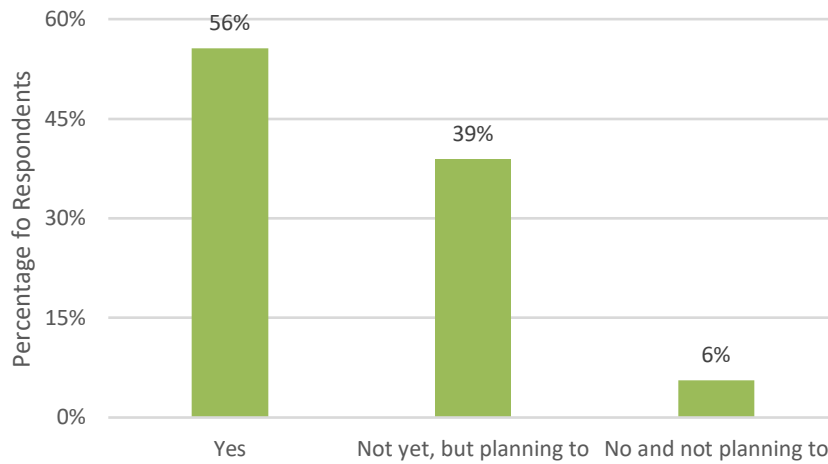
*Note: All percentages were rounded to the nearest whole number.

Did the interactions among members of the SNIP team result in new graduate student projects?
An equal number of respondents reported the SNIP grant had resulted in new graduate student projects (36%) as those who said it had not resulted in new graduate student projects (36%). Twenty-eight percent were unsure (Figure 22).

Figure 22: New Graduate Student Projects
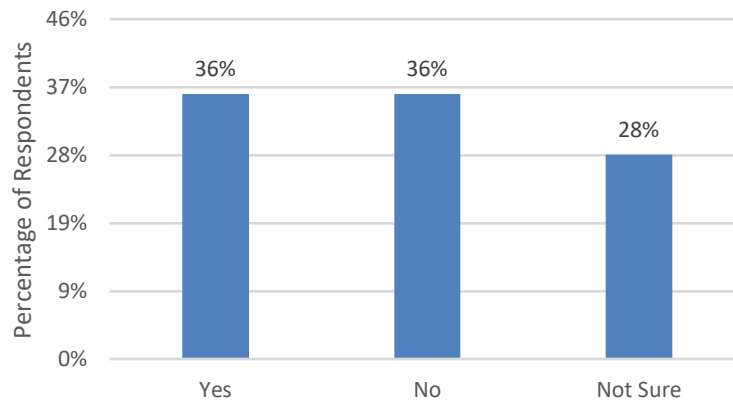
If yes, how many graduate students were involved in these new projects?
Those respondents who reported that their SNIP interactions resulted in new graduate student projects were asked how many graduate students were involved in these new projects. Six respondents indicated that there were one or two graduate students involved (Figure 23). Five respondents were uncertain.

Figure 23: Number of Graduate Students Involved in SNIP-Related Projects
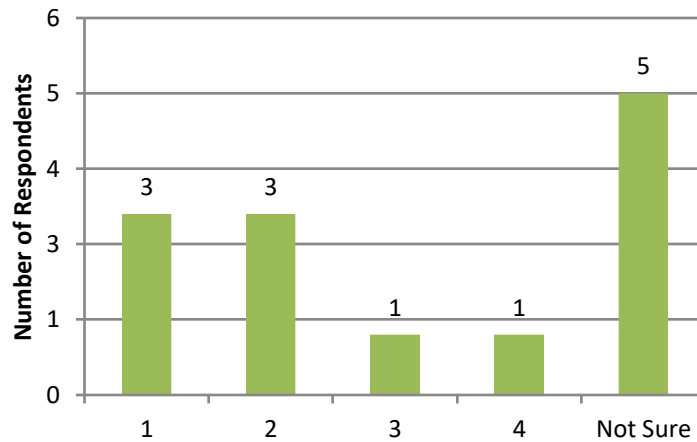
Perceived Value of the SNIP Program

The next set of questions asked respondents to indicate their perceived value about the SNIP program. They were asked to consider whether the SNIP programs addressed critical needs in the CAS, and whether participation in the SNIP project enhanced their professional networks and personal research programs.

In your opinion do the SNIP programs address a critical need in the College of Agricultural Sciences?

The majority of respondents reported "yes" (75%) and 19% were not sure (Figure 24). Six percent of respondents felt SNIP programs did not address a critical need in the CAS.

Figure 24: SNIP Program's Fulfillment of Critical Needs in College of Agricultural Sciences
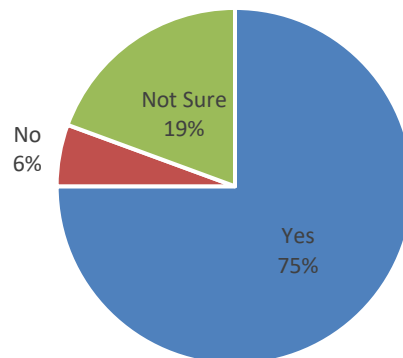
Did your participation in the SNIP team contribute to enhancing your professional network? To your research program?
Respondents were asked whether participation in the SNIP team contributed to the enhancement of their professional network as well as whether participation in the SNIP team contributed to enhance their personal research program. Seventy-nine percent reported it enhanced their professional network and 64% reported it enhanced their research programs (Figure 25).

Figure 25: Professional Benefit of SNIP Participation
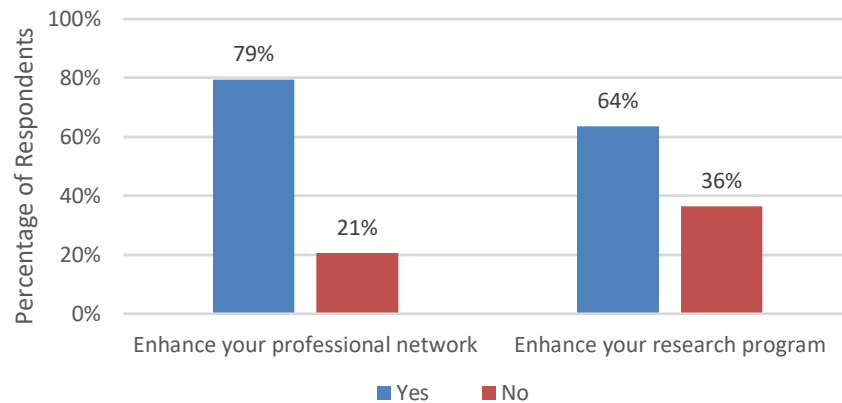
Experience in SNIP Program

The last set of questions asked respondents to report whether they felt the SNIP funding amount was adequate to fulfill the goals of their proposals and whether they have any funding that has not been used. Respondents were also given a chance to reply to an open-ended question to share anything they would like the evaluation team to know about their experience in the SNIP program.

Do you feel the SNIP funding your group received was adequate to fulfill the goals of your SNIP proposal? Does your SNIP project have any funding that has not been used?
Respondents were asked their perceptions about the funding amount given through the SNIP project and whether it was adequate to fulfill the goals of their SNIP proposals. The majority (82%) reported that the funding was adequate (Figure 26). Respondents were also asked whether any of their SNIP funding was unused. Twenty-four percent reported they have unused funding, 24% reported they have used all their funding, and 53% were unsure.

Figure 26: Adequacy and Use of SNIP Funding
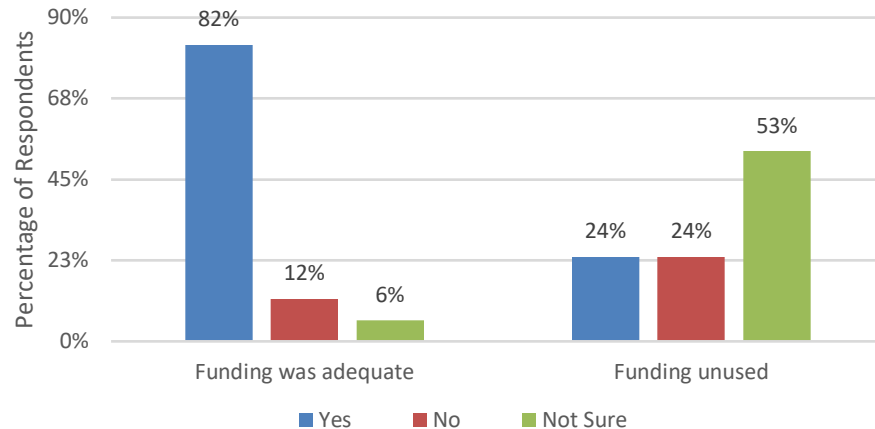
Note: All percentages were rounded to the nearest whole number.

If no or unsure, please explain why.
Respondents who replied "no" or "unsure" to the two prior questions were asked to explain their reasons. Given the small number of respondents to this question (*n* = 5), the verbatim responses are copied below:

- Conference was conducted, nothing happened afterwards, to my knowledge.
- For one, we received much more than we asked for; for the second we received much less.
- Not exactly a straight forward question, because in many ways we adjusted our goals to the funding availability so it was adequate for that but with more funds we could have done more.
- The project will not be complete until November 2018.
- Though additional funding is always welcome :) In the current funding climate, it is necessary to have considerable preliminary data to be able to successfully compete for extramural funds, and thus existing networks and projects are typically more successful.

Is there anything you would like the evaluators to know regarding your participation in the SNIP program?
This was an open-ended question designed to elicit a diversity of responses. The responses fell within three areas: 1) praise for the program, 2) critiques of the program and internal team dynamics; and 3) new ideas for the CAS to consider for future funding priorities. Given the rich description in many of the responses, the direct quotations have been kept and are categorized below:

Praise for the program
- As a young faculty member, I feel that this project has really helped link me to some more senior colleagues outside my home department and have appreciated those interactions very much.

- Great for expanding into new areas of research where publication and funding record are not yet well-established
- Doing new things usually requires people who have not talked much before (or at all) getting together. SNIP made that happen for us
- I think this is a great program!
- Our SNIP program opened more doors internally and externally (outside of Penn State) than I would have imagined possible. I am very grateful to have this opportunity so early on in my career at Penn State.

Critiques
- I think that the concept of the SNIP program is a good one however I think that to a certain degree these types of interdisciplinary interactions need to happen more organically and be driven by a larger funding source that can support graduate students and other research staff to accomplish the project goals. As PIs we are all stretched thin, which can make it hard to divest ourselves from current obligations to meet the needs of the interdisciplinary team even if it strategically aligns with our interests and professional goals.
- It has been an enormous help in boosting a long-term goal and initiative. What remains uncertain is how it can be institutionalized.
- More careful consideration of the team including the PI should be done to ensure the project is led appropriately.
- Not enough time—just everyone's plates being really full already—was probably the most limiting factor in forming new partnerships or collaborations. I'm not sure how that can be improved.
- PI retired June 30, 2017.

New ideas for the college
- Any resources for establishing and maintaining collaborations would be helpful. This seems like a stumbling block in many cases.
- Most important comments mentioned above. If the point is to build research in the CAS, I think the college should fund short-term, high-risk projects that can involve faculty from different departments, and hire someone whose job is to know the research expertise at PSU, helping to bring together faculty around large funding opportunities.
- Would be good to have SNIP grants available to foster collaborations within a department (as well as cross-department), as many new folks have merged recently and are in different disciplines and this would help to get to know one another and jump start internal collaborations.

Impact and Summary of SNIP Program

Below is a summary of the key findings of each of the evaluation objectives as well as a summary of the impact of the SNIP project.

Evaluation Question 1: What are the demographics and membership composition of the SNIP teams?

SNIP recipients are primarily tenured professors and the majority (64%) are still involved in their SNIP projects. There was a higher rate of co-PIs (72%) answering the survey than PIs (28%). This corresponds to the proportion of PIs to co-PIs listed on the grant applications. A higher percentage of recent SNIP participants filled out the survey than those of previous years. The most common cross-cutting area addressed by the funded SNIP projects was "*Advanced agricultural and food systems"* (56% of all funded SNIP projects). The next most common topic was "*Environmental resilience"* (26% of recipients). Among survey respondents, the topic *Advanced agricultural and food systems* was accurately represented (comprising 55% of survey responses and 56% of all SNIP-funded projects), while other topical areas were underrepresented among respondents to the survey. It is also possible, however, that respondents failed to recall all the topics their project addressed, particularly if there was more than one thematic area addressed by the project or the respondents represent participants in grants addressing the specific areas. This is also supported by the fact that the majority of respondents were affiliated with the departments of Plant Science (56%) and Plant Pathology and Environmental Microbiology (79%).

Although the majority of respondents have developed new research projects (58%) stemming from SNIP funding and organized seminar series (57%), it was less common for them to engage in other communication efforts. The majority of SNIP respondents had not and did not plan to foster community through the creation of new tools (64%), websites (55%) or social networking (63%).

Evaluation Question 2: What are main areas/activities of the SNIP projects?

- *Networking*

Overall, the respondents felt that their SNIP funding helped establish interdisciplinary teams or networks (74%) and that these teams or networks were successful or very successful (71%). Many respondents also felt that the SNIP project served as a platform to build partnerships within the CAS and the university (43%), while 29% felt it did so just within the CAS. It should be noted that 20% of all respondents felt the SNIP project did not serve as a platform for building partnerships. Six different colleges outside of the CAS were specifically mentioned as partners through the SNIP program and these partnerships operated as expected, through fostering proposal development and research activities.

- *Research activities*

The vast majority of SNIP respondents reported that SNIP participation stimulated faculty participation in interdisciplinary research (83%) and that these team efforts had generated new research activities already (56%) or will in the future (39%). Slightly more than one-third of respondents (36%) reported that interactions among members of the SNIP team resulted in new graduate student projects. An estimated total of 16 graduate students were involved in SNIP-related projects. However, caution should be exercised since the anonymous nature of the survey means that two individuals from the same SNIP project may have included numbers of graduate students for their shared project, so it is possible the number of graduate students may be less.

Evaluation Question 3: Did the SNIP grants bring any value to the individual recipients?

Three-quarters of all respondents reported that they felt the SNIP program fulfills a critical need in the CAS and that participation in this program enhanced their own professional networks (79%) and their own research programs (64%). The vast majority also believe the funding was adequate (82%). It should be noted that 24% of all respondents reported that they had funding left that they had not used.

Evaluation Question 4: What are the SNIP recipients' self-reported experiences with the SNIP program?

Respondents gave descriptions of their experience in the SNIP program, generally indicating high praise for the program. Some specific benefits included connecting younger faculty to others; exploring new areas of research not yet well established; and talking to new people and opening doors to those inside and outside of Penn State. The main critiques for the program included the artificial nature of funded collaborations compared to naturally occurring ones, questions about how to institutionalize these partnerships for longevity, and critiques that without careful selection of a dedicated PI a project can struggle.

Respondents also gave new ideas to the CAS about funding opportunities. These ideas included 1) funding opportunities for maintaining collaborations once they have started; 2) funding short-term, high-risk projects and supporting this effort through hiring administrative personnel to help bring together faculty to pursue larger funding opportunities; and 3) using SNIP funding to foster interdepartmental collaborations among faculty in the same department.

Evaluation Question 5: Did the SNIP grants support the development of new grant proposals? (New funding acquisition)

External funding acquisition
Half of all respondents felt the SNIP program helped foster external funding collaborations. Open-ended descriptions of external funding activities helped illustrate ways in which SNIP facilitated creation of partnerships for future funding, reaffirmed the importance of

interdisciplinary work, and helped create preliminary data to strengthen grant proposals. The majority of respondents have applied to external funding (53%) and approximately one-third plan to do so in the future (31%). The percentage of funded and non-funded applications for external funding was equal (39% each). Twenty-two percent of the proposals are still under review. Fifteen separate external funding sources were mentioned for a total amount of external funds reported at $3,915,829, with another $3,000,000 pending. Thirty-three individual faculty were mentioned by name as being involved in these externally funded projects. Results indicated that the external funding mainly supports research related to "*Environmental resilience*" and "*Advanced agricultural and food systems.*" Table 4 displays the external funding sources, dollar amounts, project duration, thematic area, team members, and graduate students involved in the external funding secured by SNIP recipients.

Internal funding acquisition
Half of all respondents also felt the SNIP program helped foster collaborations to obtain internal funding. Open-ended elaborations on this topic included describing how SNIP helped bring people together and helped foster activities, which strengthened the likelihood of obtaining internal funding. Thirty-five percent were unsure and 15% reported that SNIP did not help foster internal funding collaboration. One-third of all respondents (33%) have received internal funding and the most common sources were the CAS, PSIEE, and SSRI seed grant programs.

Table 4: Summary of External Grants Secured as Result of SNIP

Funding Source	Dollar Amount	Project Duration	Thematic Area	Team Members	Grad Students
USDA-NIFA, USDA-NRCS-RCPP	$560,000 and $396,000	3 years and 5 years	Environmental resilience for agrosystems	3	3
USDA-AFRI NIFA	~$298,000	2 years	Soil organisms for climate change and nutrient cycling	3	2
USDA-PD-STEP, USDA-AFRI-NNF, NAPPC, and pending grants with USDA and FFAR	$250,000 $3,000,000 (pending)	both 3 years		6	5
CGIAR (Consultative Group on International Agricultural Research)	$182,000	3 years	Advanced training for gender postdocs in the CGIAR system	7	multiple
NE-IPM and USDA AFRI	$50,000 and $300,000	2 years and 3 years	Food systems, environmental resilience	2	2
CGIAR & USAID	$80,000 and $600,000	1 year and 5 years	Ag & food systems, environmental, & global engagement	8	2
USDA	$1,146,429	4 years	Integrated health	2	
PA Sea Grant	$53,400	2 years	Water quality, PPCPs, environmental resilience	4	1
Total	**$3,915,829***			**35**	**15**

* Pending not included

Conclusions and Recommendations

Thematic and Departmental Representation
- The majority of the funded SNIP projects reported by survey respondents were categorized as "*Advanced agricultural and food systems"* and involved primarily faculty from the Departments of Plant Pathology and Environmental Microbiology and Plant Sciences. The proportion of SNIP-funded projects addressing *Advanced agricultural and food systems* matches the proportion of reported cross-cutting thematic areas by survey respondents. However, all other thematic areas were underrepresented by survey respondents.

- Secondary data generated from all funded proposals demonstrated that 23% of the 83 individual faculty members involved in all 20 SNIP projects are in the Plant Science department and 13% are in Plant Pathology and Environmental Microbiology. Further one-on-one interviews with faculty from various departments might be useful to gain better understanding of the causes for the different participation rates across departments, especially if the future goals of the CAS include promoting broader participation of faculty in interdisciplinary projects from both natural and social sciences.

SNIP Research Activities and Teambuilding
- The survey results indicated that the participating faculty appreciated the opportunities provided by the SNIP program for building new interdisciplinary teams and research activities. However, the respondents were much less interested in developing communication-specific activities like websites, social media, or other communication tools to be used to communicate among the members of the group or to external audiences. Communication-related training or support may help encourage faculty teams to utilize and/or to develop such tools.
- There is likely room to enhance the involvement of graduate students in SNIP-funded projects, and in the externally or internally funded additional projects attributed to SNIP funding.
- To address challenges to sustaining positive and productive team dynamics over time, training and facilitation to support teamwork may be useful.

Funding Activities
- The majority of SNIP recipients reported they have already applied to external funding or plan to do so in the future (84%), and of those who have applied 39% have been funded. This indicates that the SNIP project is fulfilling its goal of supporting efforts to obtain external funding. *Perhaps most impressively, total external funding reported by SNIP recipients is $3.9 million dollars (with an additional $3 million pending), indicating that every dollar invested in SNIP returns on average more than $8 in additional funding.* These results support the conclusion that SNIP has been successful in encouraging and fostering external funding among SNIP recipients.
- Emphasizing internal grant opportunities could be a way for SNIP participants to further leverage their initial SNIP funding and could be an opportunity to engage more graduate students in professional work, both at the application process and through the activities that would result if a project is funded.

Faculty Support for SNIP
- Overall, the SNIP project appears to have been successful in fostering interdisciplinary teams and networks both within the CAS and across the university. Moreover, SNIP respondents feel positively toward these teams, indicating that they feel their teams function successfully. A recommendation from a respondent to the survey related to this topic is for the college to consider funding support for the maintenance of these teams over time.
- Overall, there is support for SNIP among the respondents. A majority of them believe that SNIP fulfills a critical need in the CAS while also improving their personal networks and research programs. Importantly, most (82%) also believe the amount of funding is

adequate. However, one-quarter of recipients have not yet used all of their SNIP funding. It may benefit the SNIP program to consider whether the funding given to each project is more than needed in some cases. Additionally, based on previous experience, the grant administrators could provide better guidance to the faculty in preparing a budget for new types of activities unfamiliar to them.

Considerations for the College of Agricultural Sciences and Future SNIP Funding

- Given the higher proportions of participation from faculty within the Plant Pathology and Environmental Microbiology and Plant Sciences departments, it may be useful for CAS administrators to further understand why some departmental units and faculty participate in SNIP while others choose not to participate. It may also be useful for CAS administrators to further understand why some departmental units and faculty participate in SNIP while others choose not to participate.

- Encouragement of junior faculty to engage in SNIP, or other internal CAS funding, may support younger faculty who wish to engage in interdisciplinary research. If broadening the participation of SNIP projects to assistant professors is of interest to CAS, this may be a useful consideration.

- Incorporating institutional-level support of SNIP and SNIP-related projects may assist in the longevity and sustainability of these interdisciplinary partnerships. Three levels of support may be of particular help: 1) Support at the college level through a permanent administrator of the program; 2) Administrative support to provide assistance to the faculty with logistics post-award; 3) Support to assist faculty in setting up and maintaining an updated web presence.

- Systematized internal record keeping of all SNIP projects and participants can help CAS make decisions about the representation of faculty and project thematic areas funded by SNIP. Additionally, clarification of what each team role is and consistency in use of these terms would improve internal records, that is, clearly defining the terms "PI," "co-PI," "participant," etc.